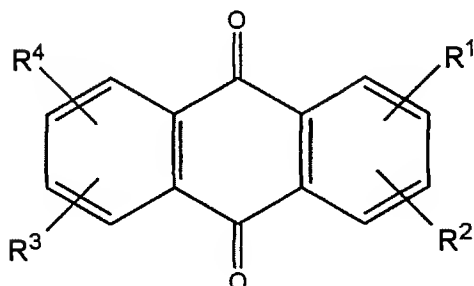
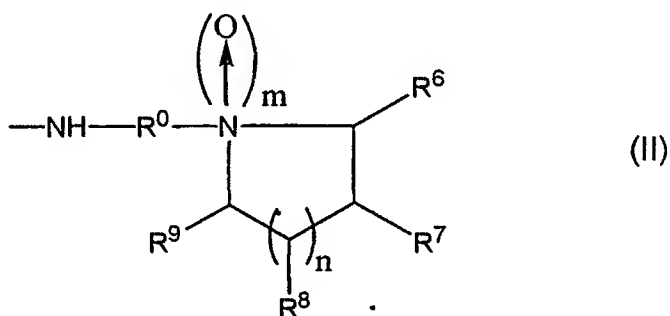


**CLAIMS**

1. An anthraquinone compound of the general formula I or a salt thereof



in which R<sup>1</sup> to R<sup>4</sup> are each selected from the group consisting of H, C<sub>1-4</sub> alkyl, X<sup>1</sup>, -NHR<sup>0</sup>N(R<sup>5</sup>)<sub>2</sub> in which R<sup>0</sup> is a C<sub>1-12</sub> alkanediyl and each R<sup>5</sup> is H or optionally substituted C<sub>1-4</sub> alkyl, and a group of formula II



in which at least one of R<sup>6</sup>, R<sup>7</sup> and R<sup>8</sup> is selected from X<sup>2</sup>, and X<sup>2</sup> substituted C<sub>1-4</sub> alkyl and any others are H or C<sub>1-4</sub> alkyl; R<sup>9</sup> is selected from H, C<sub>1-4</sub> alkyl, X<sup>2</sup> and X<sup>2</sup> substituted C<sub>1-4</sub>-alkyl;

m is 0 or 1;

n is 1 or 2;

X<sup>1</sup> is a halogen atom, a hydroxyl group, a C<sub>1-6</sub> alkoxy group, an aryloxy group or an acyloxy group; and

X<sup>2</sup> is a halogen atom, a hydroxyl group, a C<sub>1-6</sub> alkoxy group, an aryloxy group or an acyloxy group;

provided that at least one of R<sup>1</sup> to R<sup>4</sup> is a group of formula II.

2. A compound according to claim 1 in which  $R^1$  and  $R^2$  are each a group of formula II.
3. A compound according to claim 1 in which  $R^1$  is a group of formula II and  $R^2$  is  $NHR^0N(R^5)_2$ .
- 5 4. A compound according to claim 3 in which each  $R^5$  is the same and is H or  $CH_3$ .
5. A compound according to any of claims 2 to 4 in which  $R^1$  is at position 4 in the anthraquinone ring system and  $R^2$  is in position 1.
6. A compound according to any preceding claim in which  $R^3$  and  $R^4$  are selected from H and hydroxyl.
- 10 7. A compound according to claim 6 in which  $R^3$  and  $R^4$  are both hydroxyl and are substituted at positions 5 and 8 in the anthraquinone ring system.
8. A compound according to claim 6 in which  $R^3$  and  $R^4$  are both H.
- 15 9. A compound according to any preceding claim in which m is 1.
10. A compound according to any of claims 1 to 8 in which m is 0.
11. A compound according to any preceding claim in which n is 2.
12. A compound according to any preceding claim in which  $X^2$  is a halogen atom or a leaving group.
- 20 13. A compound according to claim 12 in which  $X^2$  is chlorine.
14. A compound according to any preceding claim in which either
- i)  $R^6$  is  $CH_2X^3$  and  $R^7$  is H; or
- ii)  $R^6$  is H and  $R^7$  is  $X^3$
- in which  $X^3$  is a halogen atom or a leaving group.
- 25 15. A compound according to claim 14 in which  $R^6$  is  $CH_2X^3$  and  $R^7$  is H.
16. A compound according to claim 15 in which n is 2 and  $R^9$  is  $CH_2X^3$  in which  $X^3$  is the same as  $X^3$  in  $R^6$ .
17. A compound according to claim 9 or claim 10 and/or claim 12 for
- 30 use in a method of treatment of an animal by therapy.
18. A composition comprising a compound according to claim 9 or

claim 10 and/or claim 12 and an excipient.

19. A composition according to claim 18 which is a pharmaceutical composition and in which the excipient is a pharmaceutically acceptable excipient.

5 20. Use of a compound according to claim 9 or 10 and/or claim 12 in the manufacture of a medicament for use in the treatment of an animal by therapy.

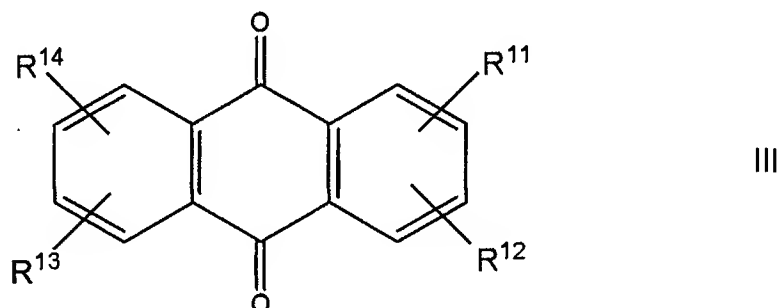
21. Use according to claim 20 in which the animal is a human.

22. Use according to claim 20 or claim 21 in which the animal is  
10 suffering from a tumour and the therapy is anti-tumour therapy.

23. Use according to claim 22 in which the compound is a compound according to claim 9 and in which the therapy additionally involves administration of a cytotoxic agent and/or radio therapy of the tumour.

24. A synthetic method in which a compound of the formula III

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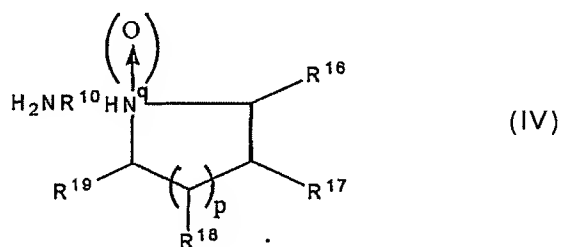
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in which  $R^{11}$  to  $R^{14}$  are each selected from H,  $X^4$ , hydroxyl,  $C_{1-4}$  alkoxy, acyloxy, a group  $-NHR^{10}N(R^{15})_2$  in which  $R^{10}$  is  $C_{1-12}$  alkane diyl and each  $R^{15}$  is H or optionally substituted  $C_{1-4}$  alkyl, and in which  $X^4$  is a halogen atom or a leaving  
25 group provided that at least one of  $R^{11}$  to  $R^{14}$  is  $X^4$ ;

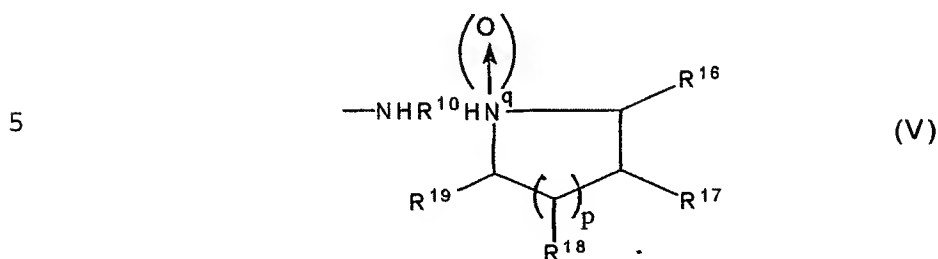
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is reacted with a cyclic aminoalkylamine compound of the general formula IV

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such that the group  $X^4$  is replaced in a nucleophilic substitution reaction by a group of formula V



10 in which either at least one of  $R^{16}$ ,  $R^{17}$  and  $R^{18}$  is selected from  $X^5$  and  $X^5$  substituted  $C_{1-4}$  alkyl and any others are H or  $C_{1-4}$  alkyl, and  $R^{19}$  is selected from H,  $C_{1-4}$  alkyl,  $X^5$  and  $X^5$  substituted  $C_{1-4}$  alkyl

$X^5$  is hydroxyl or a protected hydroxyl, or  $X^5$  is a leaving group or a halogen atom different to  $X^4$  and q is 0 or 1.

15 25. A method according to claim 24 in which at least one group  $X^5$  is hydroxyl or protected hydroxyl and in which the product is reacted with a halogenating compound optionally after deprotection to replace the or each  $X^5$  hydroxyl group by a halogen atom.

26. A method according to claim 25 in which the halogenating agent is a chlorinating agent.

20 27. A method according to any of claims 24 to 26 in which q is 0 and the product is oxidised at the ring nitrogen atom to form the corresponding amine oxide (q is 1).

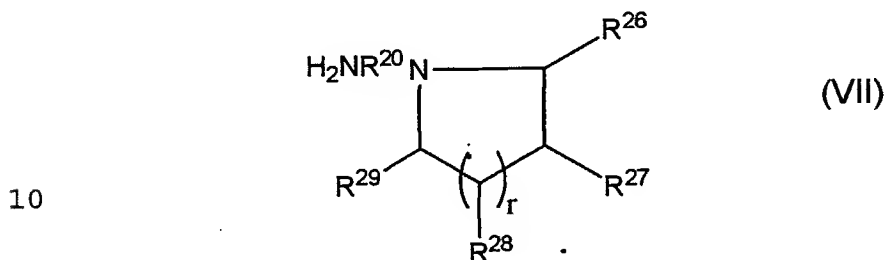
28. A method according to any of claims 24 to 28 in which one of  $R^{11}$  to  $R^{14}$  is a group  $-NH R^{10}N(R^{15})_2$  and which involves the preliminary step of  
25 reacting a precursor compound in which the corresponding group  $X^6$  where  $X^6$  is a halogen atom or a leaving group, with an acyclic aminoalkylamine compound of general formula VI



30 in a preliminary nucleophilic substitution reaction in which  $X^6$  is replaced by the group  $-NHR^{10}N(R^{15})_2$ , in which  $R^{15}$  is H or an optionally substituted  $C_{1-4}$  alkyl group.

29. A method according to any of claims 23 to 26 in which  $R^{11}$  and  $R^{12}$  are the same and are  $X^5$  and in which 2 equivalents of the cyclic aminoalkylamine compound IV are reacted whereby both groups  $X^4$  are replaced by the said group of general formula V.

5 30. A compound of the general formula VII



in which  $R^{20}$  is a  $C_{1-12}$ -alkanediyl group and either  $R^{26}$  is  $CH_2Cl$ , and  $R^{27}$  is H, or  $R^{26}$  is H and  $R^{27}$  is Cl;

15  $R^{29}$  is H or is the same group as  $R^{26}$ ;

the or each  $R^{28}$  is H or is the same group as  $R^{27}$ ; and  
r is 1 or 2.

31. A compound according to claim 30 in which  $R^{20}$  is  $(CH_2)_2$ .

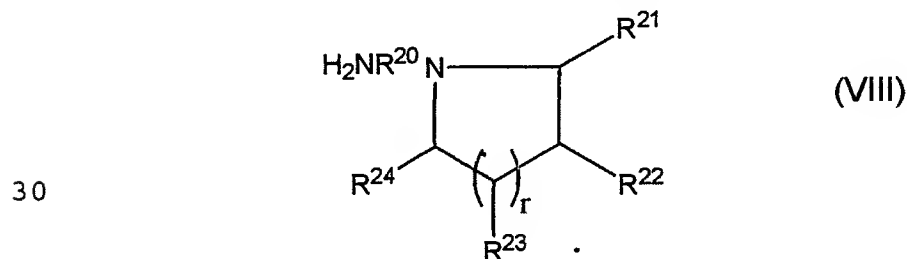
32. A compound according to claim 30 or claim 31 in which  $R^{26}$  is  
20  $CH_2Cl$ ,  $R^{27}$  is H and  $R^{29}$  is selected from H and  $CH_2Cl$ .

33. A compound according to claim 30 or claim 31 in which  $R^{26}$  is H,  $R^{27}$  is Cl,  $R^{29}$  is H and  $R^{28}$  is H.

34. A compound according to any of claims 30 to 33 in which r is 1.

35. A compound according to any of claims 30 to 33 in which r is 2.

25 36. A method of synthesis of a compound as claimed in claim 30 in which a hydroxyl-substituted cyclic tertiary amine of the general formula VIII



in which  $R^{20}$  and  $r$  are as defined in claim 30

either  $R^{21}$  is  $CH_2OH$  and  $R^{22}$  is H

or  $R^{21}$  is H and  $R^{22}$  is OH;

5  $R^{24}$  is H or is the same group as  $R^{21}$

the or each  $R^{23}$  is H or is the same group as  $R^{22}$ ;

is amine-group protected, is then chlorinated by a process in which the OH is replaced by Cl, and is deprotected to afford the desired compound of formula VII.

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